

**REMARKS**

Applicants have cancelled claims 1-42, amended claims 43-56, and added new claims 57-86. Claims 57-83 incorporate subject matter already acknowledged to be allowable over the prior art of record (*compare, e.g.*, independent claim 57 with previously presented independent claim 1) and it is respectfully submitted that claims 57-83, as presently presented, are patentable for at least the same reasons that claims 1-42 were previously indicated to contain allowable subject matter.

The Office Action rejected claims 1-56 under 35 U.S.C. § 101 asserting that claims 1-56 preempted a 35 U.S.C. § 101 judicial exception. Specifically, it was asserted that “[t]he claims preempt every ‘substantial practical application’ of an idea – a mathematical algorithm” in view of *Gottschalk v. Benson*, 409 U.S. 63, 71-72, 175 USPQ 673, 676 (1972)(*stating* that, if the judgment below were affirmed, “the patent would wholly preempt the mathematical formula and, in practical effect, would be a patent of the algorithm itself.”)

The Office Action further alleged that “none of the independent claims are restricted to any field of application, and therefore the claims are directed to all possible applications of the math recited in the claims”.

35 U.S.C. §101 provides that “[w]hoever invents or discovers any new or useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefrom, subject to the conditions and requirements of this Title.” As noted by the Supreme Court in *Diamond v. Diehr* (450 U.S. 175, 182 (1981)) and *Diamond v. Chakrabarty* (447 U.S. 303, 308 (1980)), cases of statutory construction must begin with the statute and, unless otherwise defined, “words will be interpreted as taking their ordinary, contemporary, common meaning.” The Supreme Court acknowledged that the repetitive use of the expansive term “any” in Section 101 to modify yet other expansive terms demonstrated that “Congress plainly contemplated that the patent laws would be given wide scope” *Diamond v. Chakrabarty*, 447 U.S. 303, 309 [206 USPQ 193] (1980). The Supreme Court in *Diamond v. Chakrabarty* further concluded that “[t]he relevant legislative history also supports a broad construction,” inclusive of Committee Reports accompanying the 1952 Act that clearly show Congress’s intent to “include anything under the sun that is made by man.” 447 U.S. 303, 309;

*see also, e.g., Diamond v. Diehr*, 450 U.S. 175, 182 [209 USPQ 1] (1981). The Supreme Court in *Diamond v. Chakrabarty* further stressed that “[t]he subject matter provisions of the patent law have been cast in broad terms to fulfill the constitutional and statutory goal of promoting ‘the Progress of Science and the useful Arts’ with all that means for the social and economic benefits envisioned by Jefferson” 447 U.S. 303, 315. “Congress employed broad general language in drafting §101 precisely because such inventions are often foreseeable” *Id.* at 316.

In its construction of 35 U.S.C. § 101, the Supreme Court has identified three categories of subject matter that are unpatentable, namely “laws of nature, natural phenomena, and abstract ideas.” *See, e.g., Diamond v. Diehr*, 450 U.S. 175, 185. “An idea of itself is not patentable.” *Rubber-Tip Pencil Co. v. Howard* (20 Wall.) 498, 507 (1874). “A principle, in the abstract, is a fundamental truth; an original cause; a motive; these cannot be patented, as no one can claim in either of them an exclusive right.” *LeRoy v. Tatham*, (14 How.) 156, 175 (1852).

At issue in *Gottschalk v. Benson*, a case relied upon in the Office Action, were claims for converting binary-coded decimal (BCD) numerals into pure binary numerals. As noted by the Court, “[t]he claims were not limited to any particular art or technology, to any particular apparatus or machinery, or to any particular end use” and the question raised was whether the method described and claimed was a process within the meaning of the Patent Act. 409 U. S. 63, 64 (1972). As noted by the Court, the claims at issue in *Gottschalk v. Benson* “can also be performed without a computer” (*see* 409 U. S. 63, 67) and the Court went on to state that “[h]ere the ‘process’ claim is so abstract and sweeping as to cover both known and unknown uses of the BCD to pure binary conversion” and that “[t]he end use may (1) vary from the operation of a train to verification of drivers- licenses to researching the law books for precedents *and* (2) be performed through any existing machinery or future-devised machinery *or without any apparatus.*” *See* 409 U. S. 63, 68.

The Court further characterized this conclusion, citing with approval its decision in *Mackay Co. v. Radio Corp.*, 306 U. S. 86, 94 (1939), and emphasizing that “[w]hile a scientific truth, or the mathematical expression of it, is not a patentable invention, a novel and useful structure created with the aid of knowledge of scientific truth may be.” *Gottschalk v. Benson*, 409 U. S. at 67 (*citing Mackay Co. v. Radio Corp.*, 306 U.S. 86, 94). The Court further noted in

response to those who say “that the decision precludes a patent for any program servicing a computer,” “[w]e do not so hold.” *Gottschalk v. Benson*, 409 U. S. at 71 (emphasis added). The Court in *Gottschalk v. Benson* further cited as support the pronouncement of the Court in *LeRoy v. Tatham*, noted above, that “[a] principle, in the abstract, is a fundamental truth; an original cause; a motive; these cannot be patented, as no one can claim in either of them an exclusive right.” 409 U. S. at 67. The Court in *LeRoy v. Tatham* itself expounded on the principle later referred to in *Gottschalk v. Benson* as preemption, stating that “[a] patent is not good for an effect, or the result of a certain process, as that would prohibit all other persons from making the same thing *by any means whatsoever*.” See 55 U.S. 156 at 175.

The Federal Circuit, in *State Street Bank & Trust Company v. Signature Financial Group, Inc.*, held that an invention is deemed to constitute patentable subject matter under 35 U.S.C. § 101 if it involves some practical application and “it produces a useful, concrete and tangible result.” 149 F.3d 1368, 1373 (Fed. Cir. 1998), *cert. denied*, 525 U.S. 1093 (1999). The *State Street Bank* decision framed the question of whether a claim encompasses statutory subject matter as being directed to “the essential characteristics of the subject matter, in particular, its practical utility.” The Supreme Court’s denial of the writ of certiorari in *State Street Bank* indicates that the Supreme Court supported the interpretation of 35 U.S.C. § 101 by the Federal Circuit in *State Street Bank*. *State Street Bank* stated that “[u]npatentable mathematical algorithms are identifiable by showing they are merely abstract ideas constituting disembodied concepts or truths that are not ‘useful.’” 149 F.3d at 1373. In the present case, the disclosed subject matter is certainly not disembodied and is certainly useful, as is amply demonstrated in the application disclosure (*see, e.g.*, examples provided regarding application in waveguides [0232]-[0244] and examples regarding the Packed Bed Reactor and Magnetic Brake (*starting at* [0414])).

Thus, in accord with *State Street Bank* and the Supreme Court’s acceptance thereof, the present claims do not constitute “unpatentable mathematical algorithms.” The present claims do not present an algorithm *in the abstract*, but rather produce a useful, concrete, and tangible result. Accordingly, for at least this reason, the present claims are submitted to constitute patentable subject matter. Further, Applicants note that the claims do not lay claim to a principle or prohibit others from developing alternative models achieving the same ultimate ends by other

means. Moreover, the presently pending claims are grounded in structure and do not cover use of the disclosed concepts divorced from the recited structure (i.e., the claims do not prohibit manual calculation).

Claim 43 and claims depending therefrom are hereby limited to expedite prosecution and recite “means for selecting an application mode modeling *in up to three space dimensions the* physical quantities for one or more of a plurality of systems, *wherein the plurality of systems comprise at least one of a structural system, a fluids system, and an electromagnetic system*” (emphasis added). Thus, claims 43-56 carve out a defined, limited subset of the disclosed subject matter and cannot reasonably be said to be preempt every substantial practical application of an idea. Claims 70-83 present similar limitations that are, again, respectfully submitted not to preempt every substantial practical application of an idea. Claims 43-69 are, further, presented in means plus function language in accord with Section 112, ¶ 6 of Title 35 of the United States Code to limit the claims to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

Claims 43-69, properly construed, claim an apparatus for producing a model of a combined system having physical quantities by representing physical quantities of the combined system in terms of partial differential equations, the apparatus comprising, at the very least, the specific structures disclosed in the written description and corresponding to the means-plus-function elements recited in the claims. A “machine” or “apparatus” is proper statutory subject matter under §101. Claims 84-85 recite, *inter alia*, “using the processor and the plurality of partial differential equations to determine a solution comprising numerical values for the physical quantities on the node points in the mesh” and “storing in a computer readable memory or in a computer readable data storage system the solution to the model.” Claim 86 includes similar recitations. Claims 84-86 are also submitted to recite statutory subject matter.

“[W]hen a claim containing a mathematical formula implements or applies that formula in a structure or process which, *when considered as a whole*, is performing a function which the patent laws were designed to protect (e.g., transforming or reducing an article to a different state or thing), then the claim satisfies the requirements of §101.” *Diamond v. Diehr*, 450 U.S. 175, 192 (emphasis added).

Applicants respectfully submit that the claims must be considered *as a whole*, within context of the disclosed structural limitations. Applicants submit that the claims set forth subject matter having practical utility and producing a useful, concrete and tangible result, and, properly construed, constitute patentable subject matter under §101. *See, e.g., State Street Bank, supra.*

#### CONCLUSION

It is the Applicants' belief that all of the claims are in condition for allowance and action towards that effect is respectfully requested.

If there are any matters which may be resolved or clarified through a telephone interview, the Examiner is requested to contact the undersigned attorney at the number indicated.

A request for extension of time to respond to the outstanding office action is hereby made and authorization to deduct the extension of time fees necessary to extend the period for response to today, June 26, 2008, is hereby granted. Please deduct such fees from Nixon Peabody LLP Deposit Account No. 50-4181, Order No. 801939-000111. Should any additional fees be required (except for payment of the issue fee) that have not otherwise been expressly authorized and/or paid, the Commissioner is authorized to deduct any such fees from Nixon Peabody LLP Deposit Account No. 50-4181, Order No. 801939-000111.

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Respectfully submitted,

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Date

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